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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte KALLOL BERA,
GERARDO A. DELGADINO,
ALLEN ZHAO and
YAN YE

Appeal 2008-0503
Application 10/663,304
Technology Center 2800

Decided: March 31, 2008

Before BRADLEY R. GARRIS, CHUNG K. PAK, and
THOMAS A. WALTZ, *Administrative Patent Judges*.

GARRIS, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134 from the Examiner's decision rejecting claims 1-17 and 40-45. We have jurisdiction under 35 U.S.C. § 6.

We AFFIRM.

Appellants claim a method of fabricating an interconnect structure comprising (1) providing a substrate 200, a first barrier layer 202, a conductive layer 216 embedded in a first dielectric layer 204, a second barrier layer 206, a second dielectric layer 208 and a cap layer 210, and (2) etching in-situ the cap layer, a trench 218 in the second dielectric layer, a masking material in a via hole, and the second barrier layer, by providing a plasma source power of at least about 1000 Watts and a bias power of at least about 800 Watts while etching during at least a portion of the etching step (Fig. 2; claim 1).

Representative claim 1 reads as follows:

1. A method of fabricating an interconnect structure, comprising:

(a) providing a substrate having a film stack comprising sequentially formed on the substrate a first barrier layer, a conductive layer embedded in a first dielectric layer, a second barrier layer, a second dielectric layer, and a cap layer;

(b) etching a via hole in the cap layer and the second dielectric layer;

(c) filling a portion of a depth of the via hole with a masking material;

(d) etching in-situ the cap layer, a trench in the second dielectric layer, the masking material, and the second barrier layer, by providing a plasma source power of at least about 1000 Watts and a bias power of at least about 800 Watts while etching during at least a portion of step (d); and

(e) metallizing the via hole and the trench.

The references set forth below are relied upon by the Examiner as evidence of obviousness:

Samukawa	6,177,147 B1	Jan. 23, 2001
Ikeda	6,426,299 B1	Jul. 30, 2002
Chun	TW 544,815 A	Aug. 1, 2003
Jiang	6,797,633 B2	Sep. 28, 2004

Claims 1-6, 8-10, and 40-43 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Jiang in combination with Ikeda; and claims 7, 11-17, 44, and 45 are correspondingly rejected over these references and further in view of Chun and Samukawa.

We will sustain these rejections for the reasons expressed in the Answer and below.

The Examiner finds that Jiang fails to disclose performing patentee's trench etching step with the plasma source power and bias power conditions required by claim 1 but concludes that it would have been obvious to perform the etching step with a plasma source power of at least 1000 Watts and a bias power of at least 800 Watts in view of Ikeda (Ans. 4-5). According to the Examiner, it would have been obvious to perform Jiang's etching step under these power conditions because "Ikeda discloses the conditions are useful in etching stacked layers in the formation of a damascene structure" (Ans. 9).

Appellants argue that Jiang and Ikeda contain no teaching or suggestion for the modification proposed by the Examiner (App. Br. 6; Reply Br. 4-5). Specifically, it is Appellants' contention that "neither *Jiang* nor *Ikeda* provide[s] any hint as to the desirability of the combination proposed by the Examiner" (Reply Br. 5). In this regard, Appellants state that, "[f]or example, the Examiner cites to no portion of *Ikeda*, nor provides any line of reasoning why someone of ordinary skill in the art would replace the conditions specifically taught to be performed in *Jiang* with certain specific process conditions mentioned in *Ikeda*, but not taught or suggested by *Ikeda* to provide any specific benefit or advantage over the conditions taught in *Jiang*" (*id.*).

Like the Examiner, we perceive no convincing merit in the Appellants' position. One with ordinary skill in this art would have performed Jiang's etching step using the plasma source power and bias power conditions taught by Ikeda for the simple reason that such conditions are evinced by Ikeda to be effective in performing an etching step of the type employed by Jiang. In this way, the artisan would have reasonably expected effective results in so-combining the teachings of Jiang and Ikeda. It is appropriate to here remind Appellants that the combination of familiar elements (i.e., Jiang's etching step and Ikeda's power conditions) according to known methods is likely to be obvious when it does no more than yield predictable results. *KSR Int'l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1739 (2007).

In particular, we are unpersuaded by Appellants' afore-quoted contention that there is no reason "why someone of ordinary skill in the art would replace the conditions specifically taught to be performed in *Jiang* with certain specific process conditions mentioned in *Ikeda*" (Reply. Br. 5). Contrary to the belief expressed in this contention, Jiang does not teach any specific conditions for performing the trench etching step under consideration (Jiang, col. 4, ll. 28-33).¹ In view of Jiang's failure to disclose any such conditions, an artisan would have been especially motivated to use the effective power conditions taught by Ikeda in performing the trench etching step of Jiang.

Finally, the Examiner's obviousness conclusion is reinforced by the fact that the above-discussed power conditions are recognized in this art as being result effective variables as evidenced by Ikeda. This is because it is generally considered obvious for an artisan to develop workable values for an art-recognized, result-effective variable. *In re Woodruff*, 919 F.2d 1575, 1578 (Fed. Cir. 1990); *In re Boesch*, 617 F.2d 272, 276 (CCPA 1980).

For the reasons set forth above and in the Answer, we sustain the Examiner's § 103 rejection of representative claim 1 as being unpatentable over Jiang in combination with Ikeda. We also sustain the corresponding rejection of 2-6, 8-10, and 40-43 since these claims have not been separately argued by Appellants with any reasonable specificity. Similarly, we sustain the § 103 rejection of claims 7, 11-17, 44, and 45 as being unpatentable over

¹ By way of clarification, Jiang teaches power conditions for a plasma treatment step which removes (i.e., ashes) the resist (para. bridging cols. 2-3, col. 3, ll. 63-67) but not for the trench etching step.

Jiang in combination with Ikeda in view of Chun and Samukawa since the only argument advanced against this rejection is the unsuccessful argument discussed above (App. Br. 10).

The decision of the Examiner is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv)(effective Sept. 13, 2004).

AFFIRMED

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